

**IN THE SPECIFICATION:**

Please replace paragraph [0014] with the following paragraph:

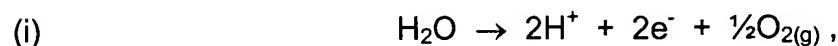
[0014] Figure 2 shows a flow diagram for a two-sectional electrochemical cell with ~~eatolyte~~ catholyte and anolyte;

Please replace paragraph [0026] with the following paragraph:

[0026] The insoluble anode 12 and the cathode 13 are separated by a membrane 16 extending through cell 11. The membrane 16 is an electroconductive membrane, such as an ion-exchange membrane, nano-filtration membrane, ultra-filtration membrane and others known in the art. The portion of the cell 11 containing the cathode 13 is in fluid communication with the ~~eatolyte~~ catholyte tank 17 to recirculate the ~~eatolyte~~ catholyte within. The ~~eatolyte~~ catholyte is a mixture of compounds that may include, for copper plating, sulfuric copper plating electrolyte or pyrophosphoric copper plating electrolyte. A sulfuric copper plating electrolyte will generally include a mixture of copper sulfate, sulfuric acid and various organic and inorganic additives including suppressors, accelerators, levelers and brighteners. ~~Gatolyte~~ Catholyte may pass through a diffuser 15 and be more evenly distributed while flowing to the substrate 14.

Please replace paragraph [0028] with the following:

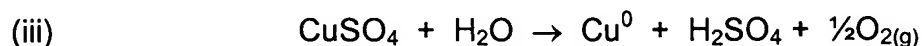
[0028] Under copper plating electrolysis, the half reaction in scheme (i) occurs on the insoluble anode 12:



while  $\text{Cu}^{2+}$  ions migrate through the membrane 16 from the anolyte to the ~~eatolyte~~ catholyte and are reduced according to the half reaction shown in scheme (ii):



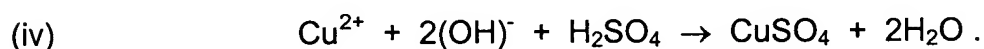
The combined half reactions are represented in reaction scheme (iii):



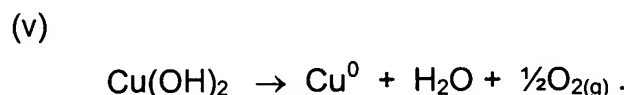
Therefore, as the electroplating process proceeds, the anolyte becomes depleted of copper ions due to the precipitation of metallic copper as well as more acidic due to the production of sulfuric acid. Also, water is consumed making the electrolyte more concentrated.

Please replace paragraph [0029] with the following:

[0029] The sulfuric acid formed in the anolyte penetrates through the membrane 16 and contaminates the ~~eatolyte~~ catholyte. The sulfuric acid lowers the pH of the ~~eatolyte~~ catholyte. More acidic ~~eatolyte~~ catholyte is not desirable because the membrane loses ion selectivity between protons and copper ions. The lost of the membrane selectivity permits protons to compete with copper ions while penetrating the membrane, therefore, unbalancing the ~~eatolyte~~ catholyte chemical concentration. To prevent the lowering of the pH of the ~~eatolyte~~ catholyte, an alkaline compound is added. Copper hydroxide consists of a copper ion source as well as a hydroxyl source and will neutralize formed sulfuric acid, as shown by the reaction scheme (iv):



Therefore, schemes (iii) and (iv) are combined and the proportional amount of copper hydroxide is added to the anolyte. The summed reaction is depicted in scheme (v), namely copper is consistently deposited while water and oxygen are formed as byproducts, such as:



Please replace paragraph [0032] with the following:

[0032] Chemical reagents 26 are compounds or mixtures of compounds selected for the process requirements of the plating solution. Plating solutions include electroless plating solutions and electroplating solutions, wherein the latter is usually the anolyte or the ~~catholyte~~ catholyte. Electroplating systems are utilized to deposit materials such as copper, zinc, cadmium, nickel and other metals. In one preferred embodiment, the plating solution is an anolyte within an electroplating system used to plate copper.

Please replace paragraph [0048] with the following:

[0048] Figure 8 is a diagram illustrating a timing sequence of valves 60 and 61 during an electroplating process useful in the plating system 50 depicted in Figure 7. The timing of valves 60 and 61 is controlled by the pH controller 54 in combination with a computer 55. The valves 60 and 61 change positions every second or so and remain synchronized as described above. When the pH of the anolyte drops to a lower limit (LL), the compressed gas (e.g., air) moves the electrolyte from canister 53 into cartridge 40. The time  $t_1$  is slightly longer (e.g., about a second) than that required to push all of the anolyte from canister 53, so that a small amount of air also penetrates ~~in to~~ into the cartridge 40. The air provides a thorough mixing of the chemical reagents with the anolyte and enriches the suspension (e.g., copper hydroxide) near the top of the cartridge 40 within headspace 49. This thorough mixing with the air and the conical shape of the bottom of the cartridge prevents cake formation. During time  $t_2$ , compressed air is stopped by closing valve 61 and canister 53 is refilled with anolyte through valve 60. During  $t_3$ , the anolyte is injected into cartridge 40 with the timing quick enough to prevent penetration of air into the canister 53, about a second. Canister 53 is refilled with anolyte that is subsequently injected into the cartridge 40. Thereafter, an enriched anolyte is transferred from the cartridge 40 to the anolyte tank 52. This cycle continues until the pH reaches a higher limit (HL), then ceases until the pH of the anolyte within the anolyte tank reaches the LL. The overall sequence repeats during the electroplating process.